

REMARKS

By this Response, Applicants propose to amend claims 1, 6, 13 and 18. No claims have been added or canceled. Claims 1-6, 13-18 and 20 are currently pending in the application in which claims 7-12 and 19 are non-elected. Support for the amendments to claims 1 and 13 can be found throughout the as-filed specification and claims, in particular at dependent claims 6 and 18. No new matter has been added.

In the event that the Examiner declines to enter the present Amendment, and (i) any portion of the present Amendment would place some of the claims in better form for appeal if a separate paper were filed containing only such amendments or (ii) any proposed amendment to any claim would render that claim allowable, Applicant respectfully requests that the Examiner inform Applicant of the same pursuant to MPEP §714.13.

Rejection of Claims Under 35 U.S.C. § 103(a)

In the Final Office Action, the Examiner rejected claims 1-5 and 13-17 under 35 U.S.C. § 103(a) as being unpatentable over *Bruno et al.*, "Study of the NF₃ plasma cleaning of reactors for amorphous silicon deposition", in view of *Yin et al.* (U.S. Patent No. 6,379,575) and further in view of *Xi et al.* (U.S. Patent No. 5,926,743). This rejection is respectfully traversed.

In the Final Office Action, the Examiner rejected claims 6, 18 and 20 under 35 U.S.C. § 103(a) as being unpatentable over *Bruno et al.*, "Study of the NF₃ plasma cleaning of reactors for amorphous silicon deposition", in view of *Yin et al.* (U.S. Patent

No. 6,379,575), *Xi et al.* (U.S. Patent No. 5,926,743) and further in view of *Doering et al.* (U.S. Patent No. 6,174,377). This rejection is respectfully traversed.

At the outset, it is respectfully submitted that a portion of the subject matter of dependent claims 6 and 18 have been incorporated into independent claims 1 and 13, respectively. Accordingly, the rejection combinations will be treated collectively as the Examiner has rejected each of 6 and 18 apart from their respective independent claims.

Independent claims 1, 13 and 20 are directed to a method (and software) for maintaining a reactor chamber of a chemical vapor deposition system, comprising, *inter alia*, repeating the following until a volume of cleaning gas used during one or more plasma clean cycles has reached a predetermined volume: . . . performing a plasma clean cycle by introducing the cleaning gas into the reactor chamber; calculating the volume of the cleaning gas used during the one or more plasma clean cycles, the volume of the cleaning gas indicating the volume of cleaning gas introduced into the reactor chamber; providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume; and scheduling a chamber maintenance procedure in response to the notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume.

It is the Examiner's position that *Bruno et al.* disclose the claimed invention but are silent as to repeating the processing steps and calculating/providing a notification of a predetermined volume or the use of software, and in the case of dependent claims 6 and 18, to remove and replace chamber parts. The Examiner therefore applies *Yin et al.* as repeating etching, transportation, and cleaning and conditioning steps; *Xi et al.* as

being “capable of” calculating the volume of cleaning gas used and providing notification of a predetermined volume; and *Doering et al.* as removing and replacing chamber parts during planned downtime and routine maintenance/cleanings.

To the contrary, it is respectfully submitted that the present invention is directed to chamber maintenance scheduling. As disclosed in at least page 10, lines 3-6 and page 12, lines 1-8 of the original application, the volume of cleaning gas entering and exiting the reaction chamber can reach a maximum after which, for example, wafer quality falls below a certain level or aluminum oxide parts of the reactor chamber may begin exhibiting defects. By calculating when this predetermined defect causing volume of gas has been supplied to the chamber, a notification of chamber maintenance can be provided.

With the exception of *Doering et al.* none of the applied references is directed to or recognizes chamber maintenance, and further none of the applied references determine to perform chamber maintenance as a function of the volume of cleaning gas that has been supplied to the chamber. In fact, the references to *Bruno et al.*, *Yin et al.* and *Xi et al.* simply address chamber cleaning *per se* subsequent to an etch process, and do not recognize the effects the cleaning plasma can have on the chamber. Because chamber maintenance is performed subsequent to and as a result of the damage caused by the cleaning process, the fact that only a cleaning process is disclosed removes these references from any teachings as to the chamber maintenance *per se*. Likewise, because they are not pertaining to chamber maintenance, one would not recognize their functions as relevant to chamber maintenance. *Doering et al.* only replaces chamber parts during “planned downtime”,

and it is the "design" of the device that permits this replacement of chamber parts, not recognition that a volume of cleaning gas will cause damage or defects.

Looking specifically at *Xi et al.*, and as recognized by the Examiner, a clean step is performed after every n substrates are processed, referring to column 10, lines 29-34 thereof. This feature is insufficient to teach or suggest that the clean should be performed after a predetermined volume of cleaning gas has been supplied to the system. There is no given relationship of the n substrates to a volume of cleaning gas, nor would such a relationship be relevant absent applicants own invention. Further, there is no recognition of the role that the cleaning gas plays in the damage to the system, and thus a need for maintenance of the system after a predetermined volume. Only by hindsight could the Examiner correlate a clean after processing of n substrates to the volume of cleaning gas.

With regard to *Yin et al.*, column 13, lines 50-60 and column 14, lines 49-58 thereof describe a "cleaning and conditioning" process. This cleaning and conditioning process is such that ceramic surfaces in the chamber are restored during the "cleaning and conditioning" process, and the conditioning is unrelated to a volume of cleaning gas because it is incorporated into the cleaning gas. Thus, no maintenance of the chamber would be required, even after a predetermined volume of cleaning gas.

Because none of the applied references recognize that the volume of cleaning gas is directly related to required maintenance on the reaction chamber, the combination cannot then achieve this recognition or understanding absent the use of hindsight. Even in combination, one of ordinary skill would not predict that the

combination notifies or schedules maintenance of the chamber based on a volume of cleaning gas.

In view of the above, Applicants respectfully request that the Examiner reconsider and withdraw the rejections of claims 1-5 and 13-17; and 6, 18 and 20 under 35 U.S.C. § 103(a). Applicants further submit that claims 2-5, 6; and 14-17, 18 are in condition for allowance, at least by virtue of their dependency from allowable claims 1 and 13, respectively.

CONCLUSION

Applicants respectfully request that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing all remaining claims into condition for allowance. Applicants submit that the proposed amendments of claims 1, 6, 13 and 18 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were either earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicants respectfully point out that the final action by the Examiner presented some new arguments as to the application of the art against Applicant's invention. It is respectfully submitted that the entering of the Amendment would allow the Applicants to reply to the final rejections and place the application into condition for allowance.

Finally, Applicants submit that entry of the amendment would place the application into better form for Appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing remarks, Applicants submit that this claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references applied against this application. Applicants therefore request the entry of this Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the

undersigned at the telephone number listed below to expedite resolution of any
outstanding issues.

Please grant any extensions of time required to enter this response and charge
any additional required fees to Texas Instruments' deposit account 20-0668.

Respectfully submitted,

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